CLIMATE ADVISERS

January 30, 2023

Ann E. Misback,
Secretary,
Board of Governors of the Federal Reserve System,
20th Street and Constitution Avenue, N.W., Washington, DC 20551

Comment on Principles for Climate Related Financial Risk Management for Large Financial Institutions

Dear Ms. Misback,

Climate Advisers is an advocacy organization that works to strengthen climate action in the United States and around the world. Although we advise on all aspects of climate policy and climate risk, we specialize in forest conservation and other natural climate solutions. For the better part of a decade, we have analyzed material climate-related financial risks to investors and companies through such projects as Orbitas and Chain Reaction Research. We commend the Federal Reserve on drafting principles that would provide a high-level framework to guide financial institutions in managing exposure to climate-related financial risks. Climate risk is global in scope and is not confined to any one sector.

In response to the Federal Reserve's request for comment on climate-related financial risks, Climate Advisers recommends an economy-wide approach that incorporates all climate-related risks, including those connected to global supply chain emissions in the agriculture, forestry, and other land use (AFOLU) sector. A holistic approach is particularly important in the AFOLU sector since many U.S. financial institutions are exposed to climate risk from the production of globally traded agricultural commodities around the world. U.S. financial institutions lending and providing credit to a range of industries face material climate-related financial risks from deforestation, including both physical and transition risks. Therefore, it is important that the Federal Reserve includes climate-related financial risks from deforestation in its principles and develops a framework that incentivizes the management of these exposures.

This comment points to opportunities for improved effectiveness within the constraints of the Fed's current mandate, including the potential for Fed collaboration with international regulators to mobilize the global systemically important financial institutions (G-SIFIs) in the international effort to address the risks from climate change by mitigating risks to financial security posed by tropical deforestation in the forest, food, and land use system (used interchangeably with AFOLU in this comment). Finally, the comment addresses the role the regional Federal Reserve Banks must play in supporting the Board's efforts to educate the public on the need for immediate climate- and nature-related action by all market participants,

including the Federal Reserve System. Beyond that, a path should be charted for comprehensive Federal Reserve Bank reform by the United States Congress, granting the Fed much-needed new sector-specific powers to lead in the global effort to address massive planetary and social instability. Below are actions the Federal Reserve should take to guide the financial system in mitigating risks from forest, food, and land use change risk and leaning into climate transition opportunities that are compatible with planetary boundaries and provide for human needs while reducing catastrophic risks from planetary instability:

1. **Domestic and International Recommendation - Incorporate forest, food, and land supply chains into climate-related financial risk guidelines**
    - Since sectors that represent about 40 percent of the U.S. economy are exposed to commodity-driven deforestation, all financial institutions should disclose how they are managing climate risks related to tropical deforestation in value chains. This is important because:
        i. Deforestation both generates GHG emissions in the current year and reduces carbon storage capacity in future years, so institutions that finance sectors with high deforestation risk have an outsized impact on climate change.
        ii. Tropical supply chains for imports of beef, palm oil, soy, timber, natural rubber, cacao, and coffee operate in regions with elevated risk of deforestation, exposing financial institutions to particularly high risk of funding activities linked to illegal logging and deforestation, environmental damage, climate change impacts, human rights abuses, and biodiversity loss, as recognized by the $8.7 trillion Investors Policy Dialogue on Deforestation.
        iii. Given the systemic material economic risks to financial institutions if global temperatures are not limited to 1.5 degrees Celsius and the essential role of standing primary forests in internationally agreed upon pathways, specific regulations related to deforestation risks need to be clearly incorporated into any financial risk rulings.

2. **Domestic Recommendation - Monetary policy – Greening the Asset Portfolio**
    - Once Treasury issues green or climate-certified (CBI) debt, the Fed can include these securities in their asset purchases (monetary policy).

3. **Domestic Recommendation - Regulatory and Supervisory Responsibilities**
    - The Fed, the banks, and their clients should aim for data collection that is targeted and limited to data that is needed when deciding on an effective and efficient course of action to reduce climate-related and nature-related risks, including those from forest, food, and land supply chains.
    - Given the extreme uncertainty introduced by planetary instability, it is not clear that stress tests based on unprecedented and unknown climate-related scenarios are comprehensive. If stress tests are used, they must include science-based catastrophic worst-case scenarios that are becoming increasingly likely as described in the climate science literature. There would also be value in scenario analyses and stress tests when used for purposes of communicating climate-related relevant information to the public. As a part of assessing climate-related financial risks, financial institutions should

monitor key forest ecosystems at particularly high risk of collapse and analyze potential impacts on financial stability. Climate Advisers has documented the material risks to U.S. financial stability that could result from continued deforestation and the potential collapse of the Amazon ecosystem, which some scientist estimate will occur when 25 percent of the Amazon is deforested.[1]

- The Fed should require banks to monitor the supply chains of their clients for linkages to deforestation. Banks should require their clients to document progress in ending deforestation and decarbonizing food production, subject to deadlines. The Fed can help by publishing and disseminating information about best risk mitigation practices, and it can hold banks accountable for ensuring implementation at the firm level by enforcing strict deadlines.
- To accelerate transformational progress, executive compensation must be tied to bank and firm climate/food/forest performance metrics (greenhouse gas emissions reductions, acres of forests saved and/or reforested, see CDP Forest disclosures for more ideas).
- Firms and banks can maximize profit by leaning into climate opportunities and mitigating climate risks. However, consumers and investors should be provided with relevant information that allows them to accurately assess companies for how they are managing climate risks.
- The Fed's priority should be the prevention of worst-case scenarios. To achieve this, the Fed must drive rapid progress with ending deforestation, and decarbonizing food production, distribution, and consumption, thus disincentivizing actions that encroach onto Indigenous Peoples' territories and damage firm reputations. If the Fed needs a new mandate with sector-specific tools to mitigate risk in multiple societal systems, the Fed must help the public understand the need for congressional action on this issue.

4. Domestic Recommendation - Educating the Public

- The Fed should help with educating the public on the need for a forest, food, and land use sector that is compatible with the planetary boundaries while meeting human needs. The public should understand the role of the financial system as a catalyst and enabler of systemic change to protect U.S. financial stability. Above all, the public should understand the role of the Fed in guiding the financial system as it mitigates systemic risks.
- The Fed should help with educating the public on the role of Treasury in issuing green and climate-related securities to mitigate forest, food, and land use risks from climate change.
- The Fed should help with educating the public on the extreme planetary risks, worst-case scenarios, and their consequences. Thus, Congress can act expeditiously to provide the Fed with the new mandates and sector-specific tools necessary to support the financial system in the process of funding the transition to a sustainable food/forestry system.

[1] Climate-Related Forest, Food, and Land Risk Threaten U.S. Financial Stability.
https://www.climateadvisers.org/insightsfeed/climate-related-forest-food-and-land-risks-threaten-us-financial-stability/

5. **International Recommendation - Mandated G-SIFI Actions in Return for Reducing Some of the Current Burdensome Regulations of G-SIFIs**
    - Require G-SIFIs to include green covenants in loan contracts to incentivize an end to tropical deforestation by 2030.
    - Encourage G-SIFIs to provide loans to client systemically important carbon emitters (SICEs) that are accelerating the transition to a sustainable food/forestry system, and to price the risks that SICEs impose when they are lagging.
    - Require G-SIFIs to ensure that SICEs do not spend on lobbying against climate-related and nature-related government policies so that financing does not contribute to increasing systemic financial risk from climate change.
    - Encourage pre-competitive collaborations with competitors, clients, researchers, and NGOs on R&D, creating and scaling new markets, food production, and delivery systems.

6. **Supportive Action by the Regional Federal Reserve Banks**
    - Educate the public on the need for the Treasury to issue green or climate-certified (CBI) bonds.
    - Educate the public on the implications of crossing multiple climate tipping points and the urgent need to prevent worst-case scenarios.
    - Educate the public on the role of the financial system and the Fed in financing the transition to a new sustainable food/forestry system.
    - Collaborate with governments and NGOs on educating consumers and investors on how to participate in the new food/forestry system (buy organic, local, etc.).
    - Green collateral lending policies.

These recommendations would help the Fed to effectively meet the needs of financial institutions that are exposed to climate-related risks from deforestation. In this comment (please see the Annex starting on page six), we broadly explain the importance of forest protection and sustainable land management practices in protecting the stability of the U.S. financial system, we discuss the financially material risks posed by deforestation to financial institutions that lend across a range of industries, and we recommend actions for the Fed to consider going forward.

Thank you in advance for considering our comments. We would be pleased to discuss any questions that you may have on our feedback.

Sincerely,

Climate Advisers

Supplemental materials in Climate Advisers' Attachment 1:

- Annex 1. What kind of Fed do we need?
- Annex 2. Systemic Climate-Related Risks from Deforestation and Unsustainable Land Use.
- Annex 3. Why deforestation matters.

- Annex 4. Examples of materiality of climate-related financial risks from deforestation and land use change.
- Annex 5. Potential Domestic Courses of Action for the Fed.
- Annex 6. Collaborate with global financial regulators on guiding the G-SIFIs to mitigate risks.
- Annex 7. The role of the regional Federal Reserve Banks.

Attachment 1: Climate Advisers Comment on the Federal Reserve Request for Information on Climate-Related Risk

January 30, 2023, submitted via email: regs.comments@federalreserve.gov

Federal Reserve, 20th Street and Constitution Avenue, N.W., Washington, DC 20551

ANNEX 1. What kind of Fed do we need?

The Federal Reserve is currently exploring ways to measure the growing risks from climate change and account for them within their regulatory framework as global greenhouse gas emissions continue unabated and climate change accelerates. The Fed's focus must shift from a reactive approach to a proactive one that aims to lead in the global effort to mitigate and reduce climate risks before they become unmanageable. For instance, when the Fed collects data and conducts climate scenario analyses, there are two areas of concern: 1) Are the results of these activities decision-useful, i.e. do they help create change on the ground that will reduce climate risks? 2) What are the opportunity costs of these activities? Could the Fed spend its time and resources in ways that lead to greater reductions of climate risks in the next 10 years before the remaining carbon budget is expected to be exhausted?[2]

The exact solutions—how to reduce emissions and how to end deforestation—will vary across economic sectors. Reform will be required within multiple societal systems and across these systems in their respective interactions. The Fed can collaborate with other central banks and governments on enabling this complex, multi-sector systemic change by requiring banks and their clients to focus on these two overriding goals: Expeditiously cutting greenhouse gas emissions and ending the destruction of natural carbon sinks. The importance of reforming the forest, food, and land sector was highlighted at COP27 with the dedication of a day to this topic[3] and the adoption of a roadmap identifying the critical role of finance in reaching the net zero destination.[4]

[2] See https://www.carbonbrief.org/guest-post-what-the-tiny-remaining-1-5c-carbon-budget-means-for-climate-policy/ and also page 6 in this paper for the estimated numbers of years before the remaining carbon budget is exhausted if temperature increases are to stay below certain limits https://essd.copernicus.org/preprints/essd-2021-386/essd-2021-386.pdf

[3] https://www.e3g.org/news/cop27-the-food-systems-cop/

[4] https://www.fairr.org/article/cop27-investors-welcome-fao-net-zero-roadmap-for-food/

ANNEX 2. Systemic Climate-Related Risks from Deforestation and Unsustainable Land Use.

As humanity is exceeding planetary boundaries, e.g. on climate change,[5] planetary instability is threatening not only the financial system, but also animal and plant species (biodiversity), ecosystems, other societal systems (food, energy, construction etc.) and, ultimately, human existence.[6] While these extreme risks endanger human civilization, planetary instability is in turn magnified by unsustainable human activities and systems, such as tropical deforestation, mining, industrial food and fossil fuel production, distribution and consumption (IPCC, 2022; World Economic Forum, 2022). Scientists now warn of "untold human suffering" if we fail to take immediate comprehensive action to address the root causes of these massive problems (Ripple et al., 2022).[7] To avoid the most catastrophic consequences in the face of market failures to price global planetary risks, multiple societal systems should transition to compatibility with planetary boundaries by adapting existing institutions, including central banks, to mitigate systemic risk.

Central banks, including the Fed, risk losing control, and the financial system may fail, when climate change becomes unstoppable as multiple of earth's climate tipping points are crossed (Lontzek et al., 2015; Lenton et al., 2019).[8] The processes currently in place have already created a path to cross climate thresholds, but the exact timing and magnitude of the catastrophic consequences are unknown (Armstrong McKay et al., 2022).[9] Mann (2021, p. 181) urges caution: "We must consider worst-case scenarios when assessing our vulnerability, particularly given the fact that we have historically underestimated the rate and magnitude of key climate-change impacts."

The U.S. financial system is interconnected with the financial systems of other countries, and its vulnerability to these global risks continues to rise the longer financial markets fail to correctly price them. The Federal Reserve shares the responsibility for safeguarding the global financial system with other central banks. Thiemann, et al. (2022) analyze changes in the global discourse about central banks' responsibilities in the face of climate change. Central banks, especially in Europe, have begun to re-examine their role in this new reality. In contrast, the Federal Reserve has remained mostly passive, thinking about how to address climate risks as they unfold rather than mitigating them before they become unmanageable (Holscher et al., 2022). A recent scorecard for the G20 central banks published by Positive Money and Green Central Banking assigns a grade of D- to the Fed and ranks it in 16th place behind the central bank of Russia on green policies and initiatives.[10]

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[5] https://www.stockholmresilience.org/research/planetary-boundaries.html

[6] These risks have been termed "non-traditional", "novel", "remote" and "frontier" among other euphemisms. See, for instance, https://www.clevelandfed.org/events/financial-stability-conference/2022/ev-20221117-financial-stability-conference-2022

[7] See also Johan Rockstroem: https://www.ted.com/talks/johan_rockstrom_10_years_to_transform_the_future_of_humanity_or_destabilize_the_planet/transcript

[8] On climate tipping points, see also https://news.climate.columbia.edu/2021/11/11/how-close-are-we-to-climate-tipping-points/

[9] For a discussion of these results, see https://theconversation.com/climate-tipping-points-could-lock-in-unstoppable-changes-to-the-planet-how-close-are-they-191043 .

[10] https://greencentralbanking.com/scorecard/

Much has changed since the Federal Reserve was last reformed with the Federal Reserve Reform Act in 1977.[11] Historical data about past crises and resolutions are unlikely to be helpful in tackling current and future challenges from unpredictable large-scale planetary changes. A new macroprudential framework is needed, both domestically and internationally.[12] Comprehensive reform cannot happen overnight, but a massive reallocation of funds in key sectors of the economy must start immediately to avoid an abrupt, deeply damaging and possibly unsuccessful transition. The Federal Reserve risks losing the ability to safeguard the stability of the financial system when the aggregate price level veers out of control. Planetary instability is a risk far greater than that because it encompasses aggregate price level instability along with instability across all economic sectors, financial institutions, and financial markets.

[11] https://www.federalreservehistory.org/essays/fed-reform-act-of-1977

[12] See https://greencentralbanking.com/2022/11/09/macroprudential-framework-climate-systemic-risk/ . Phillips et al. (2022) provide a comprehensive proposal for reform including an updated mandate for the Reserve Bank of Australia that appears suitable for the Federal Reserve and other central banks as well.

ANNEX 3. Why deforestation matters.

Climate-related financial disclosures would be ineffective in protecting investors without specific requirements directed to agriculture, forestry, and other land use (AFOLU). Globally, the forest, food, and land sector is responsible for almost a quarter (23 percent) of net anthropogenic greenhouse gas (GHG) emissions, according to the Intergovernmental Panel on Climate Change (IPCC).[13] Moreover, in the food sector, alone, if activities in the pre- and post-production systems -- such as processing, distribution, consumption, and food waste -- are included, the contribution to net anthropogenic GHG emissions from AFOLU emissions globally could be as high as 37 percent.[14]

A major reason that the forest, food, and land sector contribute so substantially to anthropogenic GHG emissions is deforestation, which alone is responsible for 11 percent of global emissions.[15] Maintaining healthy forests and reforesting degraded forest land are critical to achieving the goals of the Paris Agreement and the United Nations Sustainable Development Goals. Every IPCC pathway leading to average temperature increases of 1.5 degrees Celsius or less compared to pre-industrial temperatures is premised on no new deforestation after 2030.[16] In fact, an estimated 16 to 30 percent of climate mitigation needed to limit global emissions to 1.5-2 degrees Celsius is based on halting deforestation by 2030 and a quarter of the 2030 climate mitigation promised in countries' Nationally Determined Contributions comes from land-based mitigation options.[17]

Combatting deforestation is so important that the AFOLU sector is the only economic sector with its own chapter in the Paris Agreement. Political support for conserving and restoring forests globally was also on display in 2021 when President Biden joined more than one hundred and forty world leaders in endorsing the Glasgow Leaders Declaration on Forests and Land Use, which committed nations representing more than 90 percent of the world's forests to ending natural forest loss this decade.[18]

The impacts of deforestation are diverse and far-reaching, and emissions from deforestation have a cascading effect on climate change resilience going forward for the following reasons:

1. **Indigenous Peoples and Local Communities (IPLC):** Displacement of Indigenous Peoples risks the loss of traditional cultures and valuable expertise in maintaining healthy ecosystems that aid in mitigating climate change. Receding tropical forests have already led to frequent land disputes between commodity producers and IPLCs. Illegal encroachment onto Indigenous territories and land insecurity have also heightened

[13] Intergovernmental Panel on Climate Change, "Special report on climate change and land use," Summary for Policy Makers, A.3, p. 10, *2019,* https://www.ipcc.ch/srccl.
[14] *Id.*
[15] Pendrill, Florence, U. Martin Persson, Javier Godar, Thomas Kastner, Daniel Moran, Sarah Schmidt, et al. (2019). Agricultural and forestry trade drives large share of tropical deforestation emissions. Global Environmental Change 56:1-10. https://doi.org/10.1016/j.gloenvcha.2019.03.002
[16] *Id.*, *citing* Rogelj, J., et al. (2018). Mitigation pathways compatible with 1.5°C in the context of sustainable development. https://www.ipcc.ch/sr15/chapter/chapter-2/
[17] Intergovernmental Panel on Climate Change, "Special report on climate change and land use," Summary for Policy Makers, A.3, p. 10, 2019, https://www.ipcc.ch/srccl
[18] Georgina Rannard & Francesca Gillett, BBC News, "COP26: World leaders promise to deforestation by 2030, Nov. 2, 2021.

violence against environmental defenders defending their homes.[19] IPLCs are the most effective protectors of forest carbon and biodiversity, which is vital for investors given that intact ecosystems are worth $44 trillion to the global economic sector.[20] The traditional knowledge of IPLCs continues to be the basis for medicines and foods of incalculable value. All climate mitigation measures should include these groups as important partners because at least 36 percent of the world's large, unbroken swaths of natural forests, known as "intact forests," are held by Indigenous Peoples, along with about 80 percent of remaining biodiversity.[21]

2. **Carbon storage:** Terrestrial ecosystems release 10 to 20 percent of the total global CO_2 to the atmosphere and sequester 30 percent annually.[22] Of this, gross emissions and sequestration in the tropics are about four times larger than in temperate and boreal ecosystems combined.[23] If deforestation emissions are conflated with those of other sectors in climate-related financial risk calculations, their role in sequestering carbon in future years will likely be undervalued.

3. **Biodiversity loss:** Habitat loss is causing a biodiversity crisis and threatening valuable ecosystem services. Nowhere is this more apparent than in tropical forests, which are home to more than 80 percent of animal, plant, and fungi biodiversity.[24] Wildlife populations, including mammals, birds, fish, amphibians, and reptiles, have been reduced by 68 percent since 1970 and about one million animal and plant species face the threat of extinction.[25,26] The agriculture sector is responsible for about 80 percent of deforestation globally, but it is also among the sectors most reliant on ecosystem services, particularly pollination.[27] Pollinator loss is currently placing USD 235 billion to USD 577 billion of annual agricultural production at risk.[28] The economic cost of biodiversity loss is already estimated to be between USD 2.0 trillion and 4.5 trillion per year.[29] Loss of ecosystem services on a large scale is likely to exacerbate climate-related financial risks.

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[19] Global Witness, "Global Witness records the highest number of land and environmental activists murdered in one year – with the link to accelerating climate change of increasing concern," 29 July 2020, https://www.globalwitness.org/en/press-releases/global-witness-records-the-highest-number-of-land-and-environmental-activists-murdered-in-one-year-with-the-link-to-accelerating-climate-change-of-increasing-concern/

[20] World Economic Forum, "The Global Risks Report 2020," https://www.weforum.org/reports/the-global-risks-report-2020/

[21] Peter G. Veit, "9 Facts About Community Land and Climate Mitigation," October 2021, https://files.wri.org/d8/s3fs-public/2021-10/9-facts-about-community-land-and-climate-mitigation.pdf

[22] Liang Xu et al., "Changes in global terrestrial live biomass over the 21st century," Science Advances, Vol. 7, No. 27, https://www.science.org/doi/10.1126/sciadv.abe9829

[23] *Id.*

[24] UN Environment Programme, "UNEP and Biodiversity," September 2020, https://www.unep.org/unep-and-biodiversity

[25] WWF, Living Planet Report 2020, https://livingplanet.panda.org/en-us/

[26] UN Sustainable Development Goals, "UN Report: Nature's Dangerous Decline 'Unprecedented'; Species Extinction Rates 'Accelerating,'" 6 May 2021, https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/

[27] Id. 14

[28] Ceres, PRI, Climate Action 100+, "Global Sector Strategies: Recommended Investor Expectations For Food and Beverage," August 2021, https://www.climateaction100.org/wp-content/uploads/2021/08/Global-Sector-Strategies-Food-and-Beverage-Ceres-PRI-August-2021.pdf

[29] The Sustainable Finance Platform, "Biodiversity Opportunities and Risks for the Finance Sector," June 2020, https://nwbbank.com/download_file/729/783

4. **Soil Degradation:** Soil degradation costs an estimated USD 400 billion every year and has been linked to a potential 12 percent reduction in global food productivity and a 30 percent increase in food prices by 2030.[30] Degradation is driven by the loss of organic matter and soil erosion, excessive use of fertilizers and pesticides, other types of contamination, salinization, acidification, and a loss of genetic diversity.[31] Soil erosion, for example, is a major consequence of tropical deforestation because soil can no longer rely on intricate root structures to hold it in place or canopies to protect it from drying in the sun. Although recently deforested land may support productive agricultural activity, soil fertility decreases over time as topsoil is blown or washed away. For example, a study of deforested land in Iran measured a 70-82 percent drop in soil productivity of cultivated land and a 50 percent drop in organic matter overall.[32]

5. **Global water cycles:** As deforestation and land use change lead to the conversion of tropical forests to grasslands or savanna, less moisture is stored and released into the atmosphere. Thus, the hydrological cycle is disrupted with a major ripple effect on precipitation patterns around the world. Some climate scientists have predicted a tipping point when 20–25 percent of the Amazon is cut down, warning that the rainforest's hydrological cycle will be unable to support itself and the biome will convert to a savanna.[33] Since the Amazon provides water to a region in South America responsible for 70 percent of the continent's GDP, the risk to the continent's financial sector is sizeable. This problem is not limited to South America.[34] Deforestation in the Amazon could lead to a 25 percent reduction in rainfall in Texas, for example.[35] Meanwhile, deforestation in Central Africa could reduce rainfall in the U.S. Midwest by 5-35 percent, and deforestation in Southeast Asia can influence rainfall in Europe.[36]

6. **Clean Drinking Water and Flood Mitigation:** Deforestation and land use change can have devastating implications for the availability and quality of clean drinking water for populations both locally and regionally. Forested land covers about 31 percent of watersheds worldwide and provides essential storage and filtration services.[37] By absorbing nutrients and sediment, forests provide clean drinking water to large populations in urban centers downstream and can reduce infrastructure investments

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[30] Peter M. Kopittke et. al. "Soil and the Intensification of Global Agriculture for Global Food Security," Environment International, https://www.sciencedirect.com/science/article/pii/S0160412019315855#bbb0055
[31] Id.
[32] Salar Rezapour & O. Alipour, "Effect of deforestation on fertility attributes of Mollisols in the NW of Iran," 17 August 2016, Chemistry and Ecology, https://www.tandfonline.com/doi/abs/10.1080/02757540.2017.1288227
[33] The Nature Conservancy, "The Amazon Approaches Its Tipping Point," August 2020, https://www.nature.org/en-us/what-we-do/our-insights/perspectives/amazon-approaches-tipping-point/
[34] Id.
[35] Greenpeace, "Impacts of Deforestation on Weather Patterns and Agriculture," October 2013, https://wayback.archive-it.org/9650/20200430193134/http:/p3-raw.greenpeace.org/international/Global/international/publications/forests/2013/JN455-An-Impending-Storm.pdf
[36] Mongabay, "Rainforests Help Maintain the Water Cycle," July 2020, https://rainforests.mongabay.com/kids/elementary/404.html
[37] Katie Lyons and Todd Gartner, "3 Surprising Ways Water Depends on Healthy Forests," World Resources Institute, 21 March 2017, https://www.wri.org/insights/3-surprising-ways-water-depends-healthy-forests

and water management costs.[38] By storing water in roots, branches, and canopies, forests can also reduce the intensity of flooding and mitigate irregular rainfall patterns. Conversely, deforestation and land use change can lead to devastating floods, an increased need for costly infrastructure, and significant pollution because of the loss of ecosystem services and preventing the runoff of agricultural fertilizers and pesticides previously discussed.

7. **Pollution:** In addition to absorbing CO_2, trees absorb toxic chemicals and filter the air providing noteworthy benefits to human health. Despite only covering six percent of land, tropical forests produce 40 percent of the world's oxygen alongside the absorption of harmful pollutants.[39] Furthermore, particulate matter from fires linked to longer dry seasons and land clearing for agricultural use has been shown to increase pollution-related hospitalizations by 65 percent and to cost the Brazilian public healthcare system the equivalent of USD 660,000 during the 2019 fire season.[40] With wildfire seasons increasing in severity and longevity, driven by climate change and the effects of global deforestation, a major step in mitigating the potential pollution impacts must include curbing global deforestation.

Furthermore, deforestation and land use change pose significant risks that go far beyond climate change:

1. **Infectious disease outbreak:** Deforestation and land use change lead to habitat loss and increase the likelihood of zoonotic infectious diseases that result from proximity between humans and animals. Since infectious disease emergence is driven primarily by land use change (31 percent), followed by agriculture (15 percent), commodity-driven deforestation is a primary risk factor for future pandemics.[41] According to some studies, 75 percent of emerging infectious diseases are zoonotic compared to 60 percent of all existing infectious diseases, which indicates that habitat loss resulting from land use change is playing an increasing role in the emergence of infectious disease over time.[42] The Covid-19 pandemic has provided some insight into the potential costs of infectious diseases to both humans and the economy. In addition to the millions of lives lost, as early as October of 2020, the International Monetary Fund estimated that the pandemic would cost the global economy USD 28 trillion in lost output.[43] Without halting

[38] Suzanne Ozment et. al. "Protecting Drinking Water At The Source," World Resources Institute, https://wriorg.s3.amazonaws.com/s3fs-public/Protecting_Drinking_Water_at_the_Source.pdf
[39] Jeri Curley, "How Does Deforestation Affect the Air?" 16 March 2018, Sciencing, https://sciencing.com/deforestation-affect-air-10632.html
[40] Andre Albuquerque Sant Anna & Rudi Rocha, "Health Impacts of Deforestation-Related Fires in the Brazilian Amazon," August 2020, https://www.hrw.org/sites/default/files/media_2020/08/Health%20Impacts%20of%20Deforestation-Related%20Fires%20in%20the%20Amazon_EN_0.pdf
[41] Elizabeth Loh et. al. "Targeting Transmission Pathways for Emerging Zoonotic Disease Surveillance and Control," July 2015, https://www.liebertpub.com/doi/abs/10.1089/vbz.2013.1563
[42] UNEP, "Emerging Issues of Environmental Concern," 2016, https://wesr.unep.org/media/docs/assessments/UNEP_Frontiers_2016_report_emerging_issues_of_environmental_concern.pdf
[43] The Guardian, "The IMF Estimates Global Covid Cost at USD 28 Trillion in Lost Output," 2020, https://www.theguardian.com/business/2020/oct/13/imf-covid-cost-world-economic-outlook

deforestation, the likelihood of people being exposed to more costly zoonotic diseases we are unprepared to manage will continue to increase.

2. **Illegal activity:** The lack of transparency into complex supply chains provides a cover for illegal activities, including deforestation, intentional fires, and human rights abuses. Most deforestation in the developing world that is linked to internationally traded commodities is illegal (violates local law) or is connected to organized crime.[44] Corruption, bribery, money laundering, illegal logging, and other illegal acts referred to as "forest crimes" are common in the forest and land use sectors in many developing countries. The potential consequences, which can be widespread, include social conflict, injustice, poverty, economic stagnation, and carbon emissions.

3. **Environmental refugees and local conflict:** By depleting ecosystem services that millions of people rely on for food, clean water, and energy, deforestation and land use change are likely to create climate change refugees and exacerbate geopolitical conflict. The inevitable floods, droughts, and repeated crop failures are likely to destabilize economies as they become unable to support their populations. Over 1.2 billion people could become climate change refugees by 2050.[45] The world is already experiencing climate refugees and this tragedy will continue to increase in the near term. For example, the 90 percent reduction in the size of Lake Chad has provided some insight into the scale of potential migration patterns with 2.4 million displaced people and increased geopolitical conflict in the region.[46]

4. **Medical Innovation:** Future medical breakthroughs are dependent on the conservation of plant biodiversity today. The market for medicinal plant products is valued at over 100 billion USD and approximately 80 percent of the global population is reliant on botanical drugs.[47] Moreover, a quarter of modern medicine originates in tropical forests.[48,49] Yet, scientists have only scratched the surface of cataloging and understanding the vast biodiversity of the world's forests. It is estimated that up to 100 species of animal and plant species disappear daily as tropical forest habitats are destroyed.[50] A loss of plant biodiversity before medicinal values are understood is likely to lead to adverse impacts on human health and a slowdown in innovation in the pharmaceutical industry globally.

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[44] Forest Trends, "Illegal agriculture is the main reason we're still losing forests. Is a crackdown coming?" 19 May 2021, https://www.forest-trends.org/blog/illegal-agriculture-is-the-main-reason-were-still-losing-forests-is-a-crackdown-coming/

[45] Tetsuji Ida, "Climate Refugees – the World's Forgotten Victims," 18 June 2021, https://www.weforum.org/agenda/2021/06/climate-refugees-the-world-s-forgotten-victims/

[46] UN Migration, "Environmental Migration Portal," https://environmentalmigration.iom.int/country/chad

[47] Abayomi Sofowora, "The Role and Place of Medicinal Plants in the Strategies for Disease Prevention," 12 August 2013, National Library of Medicine, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3847409/

[48] "Ten things you may not know about forests," Food and Agriculture Organization of the United Nations, September 2017, https://www.fao.org/zhc/detail-events/en/c/1033884/

[49] Tuhinadri Sen & Samir Kumar Samanta, "Medicinal Plants, Human Health and Biodiversity: A Broad Review," Biotechnological Applications of Biodiversity, https://link.springer.com/chapter/10.1007/10_2014_273

[50] COP9 Press Kit Forests, "Forest Biodiversity," https://www.cbd.int/doc/meetings/cop/cop-09/media/cop9-press-kit-forest-en.pdf

ANNEX 4. Examples of materiality of climate-related financial risks from deforestation and land use change.

Actors in financial markets have already signaled that they consider deforestation a financially material climate risk. A recent investor initiative with USD $10 trillion in assets under management, the Investors Policy Dialogue on Deforestation (IPDD), is indicative of investors' growing understanding.[51] IPDD, established in 2020, consists of 64 financial institutions and investors concerned about the "financial impacts that deforestation and the violation of the rights of indigenous Peoples and local communities may have on their clients and investee companies by potentially increasing reputational, operational and regulatory risks."[52] It identifies three channels by which deforestation risks create financial risk for issuers and investors: ESG risks; supply chain risks; and finance sector risks.[53]

These supply chain risks are concentrated in commodities coming from Indonesia and Brazil, which together generate roughly 60 percent of the GHG emissions generated from tropical deforestation.[54] Although the supply chain risk is concentrated from a country perspective, a broad cross-section of global industrial and retail sectors is directly exposed to tropical commodity supply chain risks. These sectors include food and beverage processing and production, automobile manufacturing, textiles, chemicals, pharmaceuticals, retail, food services, personal care products, print publishing, forestry, construction, energy and biofuels, and finance.[55] Below is a summary of the types of climate change risks in forest, food, and land, according to TCFD classifications.

Physical climate-related financial risks from deforestation:

1. Deforestation exacerbates the physical risk from climate change by reducing the capacity of carbon sinks, eroding fertile soil, changing local precipitation patterns, and

[51] *See* IPDD, https://www.tropicalforestalliance.org/en/collective-action-agenda/finance/investors-policy-dialogue-on-deforestation-ipdd-initiative/. IPDD has a secretariat established by the World Economic Forum and is supported by PRI (U.N. Principles for Responsible Investment).

[52] *Id.*

[53] *Id.* Among ESG risks, IPDD identifies GHG emissions, biodiversity loss, flood and soil erosion, and rainfall reduction among environmental risks; land rights violations, Indigenous Peoples' rights violations; and health hazards from increased exposure to haze as among social risks of concern; and illegality of the deforestation, bribery to reduce enforcement of limits on permissible forestry or agriculture, and financial crimes, including tax evasion and money laundering, as among governance concerns. Supply chain risks include productivity declines; property damage; increased security staff costs, inability to adapt to changes in regulation, litigation for failure to manage ESG risks, and cancellation of contracts and reduced demand from consumers concerned about deforestation. Finance sector risks include losses to investors from stranded assets or negative returns on investments; banks' losses from nonperforming loans, increased default risk and loss of revenues; regulatory risks from the inability of companies to meet new regulatory requirements, such as due diligence/ESG requirements and risk weightings; failure to disclose ESG risks in portfolios; possible litigation against investors for breach of fiduciary duty due to failure to integrate ESG; increased accountability for ESG impacts under the new OECD guidelines; and reputational risks from damage to brand value and loss of credibility as a responsible investor or bank. *Id.*

[54] Pendrill, Florence, U. Martin Persson, Javier Godar, Thomas Kastner, Daniel Moran, Sarah Schmidt, et al. 2019. Agri-cultural and forestry trade drives large share of tropical deforestation emissions. Global Environmental Change 56:1-10. https://doi.org/10.1016/j.gloenvcha.2019.03.002.

[55] Niamh McCarthy and Matthew Piotrowski, "Climate-Related Forest, Food, and Land Risks Threaten US Financial Stability," Climate Advisers, January 2021, https://www.climateadvisers.org/wp-content/uploads/2022/01/Climate-Advisers-Climate-Related-Forest-Food-and-Land-Risks-Threaten-US-Financial-Stability.pdf

increasing the likelihood of more extreme weather events. These changes are, in turn, likely to lead to lower agricultural yields and stranded assets.[56]

2. We are all reliant on ecosystem services from healthy intact tropical forests to store emissions, regulate precipitation patterns vital to agricultural production, inspire medical breakthroughs, prevent mass migration, and curb the emergence of infectious diseases like Covid-19, and much more.[57]

Transition climate-related financial risks from deforestation:

1. Policy and legal risks result from government policy changes, litigation, or law enforcement.
    a. The COP26 agreement that resulted in pledges from over 140 countries to halt deforestation by 2030 is likely to accelerate conservation efforts for high conservation value and high carbon stock land.[58] For example, in Indonesia, as much as 76 percent of unplanted palm oil concessions may experience legal or economic stranding by 2040 due to conservation efforts in line with international pledges and the country's Nationally Determined Contribution.[59]
    b. Orbitas estimates that conservation efforts globally will result in a 52 percent increase in the price of agricultural land, which will increase the cost of agricultural expansion and, in turn, global commodity prices.[60]
    c. International momentum on carbon pricing is estimated further to increase operating costs of emissions-intensive agricultural producers by as much as 14 percent.[61] Similarly, carbon border adjustments will have ripple effects across supply chains.
    d. Supply chain due diligence obligations in Europe are also likely to require businesses to prove that their products and services are deforestation-free, which could negatively impact global businesses if they are not prepared or have not developed the resources to do so.[62]
    e. Legal actions are increasingly being taken against high-emitting companies that are responsible for escalating climate-related damages.[63]

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[56] Niamh McCarthy and Matthew Piotrowski, "Climate-Related Forest, Food, and Land Risks Threaten US Financial Stability," Climate Advisers, January 2021, https://www.climateadvisers.org/wp-content/uploads/2022/01/Climate-Advisers-Climate-Related-Forest-Food-and-Land-Risks-Threaten-US-Financial-Stability.pdf

[57] Id. 21

[58] Jake Spring and Simon Jessop, "Over 100 global leaders pledge to end deforestation by 2030," Reuters, November 2021, https://www.reuters.com/business/environment/over-100-global-leaders-pledge-end-deforestation-by-2030-2021-11-01/

[59] Orbitas, "Climate Transition Risk Analyst Brief: Indonesian Palm Oil", August 2021, https://orbitas.finance/2021/08/27/indonesian-palm-oil-deforestation-climate-transition-risk/

[60] Orbitas, "Agriculture in the Age of Climate Transitions: Stranded Assets. Less Land. New Costs. New Opportunities," December 2020, https://orbitas.finance/2020/12/03/ag-climate-transitions-risk-opportunities/

[61] Id. 66

[62] Chain Reaction Research, "The Chain: EU Proposal on Deforestation-Linked Products Poses Risks for Companies, Investors," November 2021, https://chainreactionresearch.com/the-chain-eu-proposal-on-deforestation-linked-products-poses-risks-for-companies-investors/

[63] FP, Climate & Systemic Risk: The financial sector's role in managing risk and accelerating the transition to net-zero," https://foreignpolicy.com/2021/11/29/global-finance-and-management-of-climate-related-risk/

2. Technology risks originate from disruptive innovations or the rise of substitute products.
    a. In a world with constraints on land availability due to forest conservation, the commodity producers that prioritize emissions reduction technologies and investments that increase productivity will be more resilient in the face of supply chain disruptions.[64]
    b. Alternatively, a lack of investment in new agroforestry techniques and technologies may lead to lower yields than competitors or reduced resilience to climate change.

3. Market risks arise from quickly changing market dynamics.
    a. Consumer demand for low-carbon and deforestation-free sourcing has increased No Deforestation, No peat, No Exploitation (NDPE) requirements for consumer goods companies, manufacturers, and retailers. In turn, NDPE policies now cover around 83 percent of palm oil refineries.[65] Companies without effective mechanisms to prevent deforestation in supply chains may see declines in market access as trends in consumer preferences continue.
    b. As countries committed to halting deforestation, 10 of the largest global agricultural commodity traders, including Cargill, JBS, Bunge, Marfrig, Golden Agri-Resources, and Wilmar International, also announced deforestation pledges.[66] As the industry moves toward no-deforestation policies and monitoring, climate laggards risk seeing a declining market and rising input costs due to upstream physical and operational risks.
    c. Over 30 financial institutions with USD 8.7 trillion in assets under management committed to ending investment in deforestation-linked activities, which may jeopardize access to credit and increase the cost of credit for companies that do not mitigate these risks.[67]
4. Reputational risks are driven by actions that damage a company's public image.
    a. These risks are on the rise as investors and consumers alike are demanding that companies align products and services with global emissions-reduction goals and no-deforestation policies.
    b. Companies face increased scrutiny from NGOs, consumers, and governments if deforestation risk is not disclosed.
    c. In a world where news of controversies spreads quickly and more than 50 percent of consumers in Western countries are willing to pay a premium for

[64] Orbitas, "Agriculture in the Age of Climate Transitions: Stranded Assets. Less Land. New Costs. New Opportunities," December 2020, https://orbitas.finance/2020/12/03/ag-climate-transitions-risk-opportunities/
[65] Chain Reaction Research, "NDPE Policies Cover 83% of Palm Oil Refineries; Implementation at 78%," April 2020, https://chainreactionresearch.com/report/ndpe-policies-cover-83-of-palm-oil-refineries-implementation-at-75/
[66] UN Climate Change Conference 2021, "Agricultural commodities companies corporate statement of purpose," November 2021, https://ukcop26.org/agricultural-commodity-companies-corporate-statement-of-purpose/
[67] Global Canopy, "Thirty financial institutions commit to tackle deforestation," November 2021, https://globalcanopy.org/press/thirty-financial-institutions-commit-to-tackle-deforestation/

sustainable products, companies risk material financial impacts when links to deforestation and human rights abuses emerge.[68]

Specific climate disclosures related to deforestation risks are increasingly necessary due to the:

- Systemic economic and financially material physical risks to investors if limiting temperature increases of 1.5 degrees Celsius or less is not achieved; and the
- Financially material climate transition risks to investors if public and private sectors collaborate to mitigate the worst impacts of climate change.

[68] Accenture Chemicals, Global Consumer Sustainability Survey, 2019: https://www.slideshare.net/accenture/accenture-chemicals-global-consumer-sustainability-survey-2019; Toluna, 2019 Sustainability Report: Consumers Hold Brands Responsible: http://go.toluna-group.com/l/36212/2019-10-30/5p7ppd; First Insight, The State of Consumer Spending 2020: https://www.firstinsight.com/white-papers-posts/gen-z-shoppers-demand-sustainability

ANNEX 5. Potential Domestic Courses of Action for the Fed.

Currently, the Federal Reserve faces numerous legal and political barriers to using monetary policy and its regulatory and supervisory authority to address challenges from climate change and planetary instability in the United States. Because Federal Reserve officials are not elected, the institution must remain politically neutral and avoid favoring specific economic sectors in the U.S. Its explicit dual goals, price level stability and full employment, are set by Congress. Its goal of financial system stability, as a necessary pre-condition, is merely an implicit goal that can be inferred from the Dodd Frank Act (Skinner, 2022). The Federal Reserve System is operating based on the assumption that financial markets are able to price and manage all relevant risks without central bank interference. This assumption is no longer realistic in the age of anthropogenic climate change and human-induced planetary instability.

1. Monetary Policy Recommendation – Greening the Asset Portfolio

Because the Fed is unable to buy private assets, Treasury would have to issue green or climate-related bonds[69] before the Fed could use its asset portfolio to address climate change from deforestation, food production and land use. As the Fed is currently legally constrained in its ability to address climate-related and nature-related risks and the associated social justice issues with monetary policy, the Fed is vulnerable to political attacks anytime it tries to get involved on these issues. Therefore, the Fed should cooperate with Treasury on green bonds to tackle the profound threats to financial system stability that remain unpriced in financial markets.

2. Regulatory and Supervisory Responsibility Recommendation

Regarding bank regulation and supervision, the FSOC, led by the Secretary of the Treasury, can link certain activities to financial system stability risks, and the Fed may be able to provide some microprudential supervision of these activities. So far, the Fed's efforts have centered primarily on exploring opportunities for climate-related data collection and climate stress tests. The Fed has been supported in these efforts by the Office of Financial Research which recently introduced a pilot for a Climate Data and Analytics Hub.[70]

In its data collection efforts, the Fed should focus on data that are decision-useful, and guide the private sector in doing the same.[71] Regarding climate scenario analyses and stress testing, the Fed's efforts to date appear to have underestimated climate- and nature-related risks from planetary instability.[72] The Fed and other central banks should incorporate the results of climate science regarding the catastrophic consequences of crossing multiple climate tipping points, leading to compound crises that would create instability in the global financial system. The chances that the Federal Reserve is able to successfully protect the financial system from extreme planetary instability with backward-looking data gathering and climate stress tests that

[69] Climate Bonds Initiative https://www.climatebonds.net/

[70] https://home.treasury.gov/news/press-releases/jy0895

[71] A recent report by Manifest Climate finds that, while climate-related financial disclosure by the private sector is increasing consistent with TCFD recommendations, only about half of it can help inform actions that mitigate climate risks. See https://www.manifestclimate.com/blog/climate-disclosure-benchmark-review/

[72] See https://greencentralbanking.com/2022/11/17/scenario-analysis-understates-climate-risks-fsb-ngfs/ and also https://www.fsb.org/2022/11/current-climate-scenario-analysis-exercises-may-understate-climate-exposures-and-vulnerabilities-warn-fsb-and-ngfs/

allow financial institutions to pass with business-as-usual practices are nil. All financial institutions would likely see negative outcomes from climate stress tests if these tests modeled the massive risks described by climate science. Using complex scenario analyses and stress tests based on the results of climate science might help (e.g., Battiston et al., 2022; Gasparini et al., 2022),[73] but even more sophisticated models cannot guarantee that the results will correctly anticipate the unknown that lies ahead and protect the financial system from a potentially catastrophic future. Climate scenario analyses that consider worst-case scenarios may also have value in the Fed's communications with the public on the catastrophic consequences from planetary instability that require urgent preventive action.

The most promising approach to tackling worst-case scenarios is to immediately do everything possible to prevent their occurrence. Therefore, the Fed should focus its time and resources on driving rapid and global progress with ending tropical deforestation, protecting carbon sinks, and decarbonizing food production. The Fed should require banks to monitor their clients' global supply chains and document the protection of indigenous communities, the rainforests, [74] other large-scale carbon sinks and, thus, the reputations of banks and their corporate clients. Metrics such as those developed by CDP Forests and/or Hall et al. (2022) for measuring climate risk exposures in supply chains could also be used for risks associated with deforestation. The Fed should follow the ECB's example and save banks and their clients time by publishing and disseminating good (best) practices in climate-related and nature-related risk management and ensuring timely plan implementation by enforcing firm-specific deadlines (European Central Bank, 2022).

3. Educating the Public

The Fed should do much more to educate the public on worst-case scenarios that are becoming more likely the longer effective global climate action is postponed. The public should become supportive of the Treasury issuing green and climate-related securities to help fund the transition to new societal systems that are compatible with planetary boundaries. The public must understand that the financial system, guided by the Fed, needs to enable an end to tropical deforestation and the transition to a decarbonized forest, food, and land use (and others, including energy, construction, transportation, etc.) system by 2030. Education is necessary to ensure that the public is informed and supportive of new mandates for the Fed to address these unprecedented large-scale challenges with sector-specific tools.

[73] See also recent article in the Washington Post: https://www.washingtonpost.com/climate-environment/interactive/2022/global-warming-1-5-celsius-scenarios/

[74] The Amazon rainforest is currently feared to transition from serving as a valuable carbon sink to acting as a carbon emitter. https://www.nature.com/articles/s41586-021-03629-6.epdf

ANNEX 6. Collaborate with global financial regulators on guiding the G-SIFIs to mitigate risks.
In the near term, a possible path forward for the Fed may lie in its international engagement through its participation on the Financial Stability Board (FSB). The FSB, in collaboration with other international regulatory bodies, regulates the G-SIFI's which, in their role as global financial intermediaries, are responsible for screening and monitoring the climate-related and nature-related credit risk exposures of their carbon-emitting clients. The Federal Reserve, as a member of the FSB, can help shape the supervision and regulation of the G-SIFIs. This is important because the G-SIFIs are instrumental in funding the SICEs, a small subset of firms and governments that are responsible for the majority of carbon emissions (see Armour et al., 2021, p. 34 and footnote 173). Targeted regulatory mandates could guide the G-SIFIs in allocating funds based on a more accurate depiction of risks, including climate-related financial risks. The following sections offer suggestions for changes that the Fed should initiate and support to end tropical deforestation, achieve net zero carbon emissions in global food production, distribution and consumption, and reform land use, food security, and social justice - all in the required short period of time.

1. Status Quo: Financial institutions are lagging in policies to mitigate climate-related risks from deforestation
Global Canopy and others have already provided a set of data, tools, and recommendations for the finance sector to track the risks associated with deforestation.[75] In a separate report, the organization assesses financial institutions' net zero commitments, deforestation policies regarding specific commodities (e.g., cattle, soy, palm oil, timber) and human rights policies. So far, few financial institutions have policies in place and, among the firms that have made commitments and adopted policies, implementation is weak.[76]

2. The need for mandatory action: Voluntary alliances are well-intentioned but unlikely to deliver results at the required speed
Launched in 2021, the Glasgow Financial Alliance for Net Zero (GFANZ) has called upon financial institutions to end deforestation and reverse it by 2030.[77] However, the voluntary Alliance faces formidable challenges making it unlikely that this goal will be achieved without any mandatory regulatory requirements. Several major banks recently announced their plans to leave the Alliance citing a lack of government support and international coordination along with legal concerns about possible antitrust action.[78]

The academic literature cautions against relying on voluntary action by financial institutions to address environmental risks (Kacperczyk and Peydro, 2022). The results of Haushalter et al. (2022) also provide reasons to be skeptical that voluntary announcements of bank climate-related and nature-related policies will bring about the necessary changes. The authors analyze the impacts on bank lending and mountaintop removal coal mining when banks create policies

[75] https://guidance.globalcanopy.org/wp-content/uploads/2022/02/Finance-Sector-Roadmap_0222.pdf
[76] See https://forest500.org/publications/climate-wake-business-failing-hear-alarm-deforestation and also https://forest500.globalcanopy.org/financial-institutions/
[77] https://www.gfanzero.com/press/statement-on-deforestation-financing-from-the-co-chairs-and-vice-chair-of-gfanz/
[78] https://www.reuters.com/business/finance/major-us-banks-threaten-leave-mark-carneys-climate-alliance-ft-2022-09-21/

that are not mandatory and not enforced. Mandatory requirements are necessary to ensure on-the-ground progress. So what kinds of regulation are likely to be most effective?

3. Mandating action for entire industries may be intractable and unnecessary

Regulatory mandates for financial institutions tend to face more opposition the more comprehensive and the more far-reaching they are. For the SEC, for instance, Karpoff et al. (2022) recommended narrowly focusing any ESG disclosure requirements on firms' cash flows. What does this mean for actions the Fed/FSB should take? The Fed is unable to adopt international standards for climate- and nature-related regulation and supervision (e.g., Financial Stability Board, 2022a and 2022b) and implement them in the U.S. financial system. However, through its representation on the FSB,[79] the Fed can collaborate with international financial regulators, the Basel Committee on Banking Supervision (BCBS) and the International Association of Insurance Supervisors (IAIS), on crafting climate- and nature-related regulatory and supervisory standards for the G-SIFIs.[80] Instead of creating an industry-wide or sector-wide set of whole-government regulations, the Fed in collaboration with the FSB can issue a few narrowly focused mandates affecting only the G-SIFIs and their business relationships with the SICEs. (One possible list of SICEs: https://earth.org/major-companies-responsible-for-deforestation/)

To promote financial stability, Hogan (2018) and Bolton et al. (2021) argue that regulations are most effective when they are strong, easy to interpret, avoid burdensome complexity and can be enforced. Accordingly, the Fed should encourage the FSB to craft limited regulations focused on the relatively small number of G-SIFIs in their transactions with the SICEs. Importantly, these regulations must be supportive of the G-SIFIs and SICEs focus on shareholder value creation. The G-SIFIs should provide evidence of rapid progress on the part of the SICEs with ending tropical deforestation, mitigating climate risks in food production and land use, and tackling the associated human rights challenges and food supply issues. To make this work, it is necessary to adopt a holistic systems approach. Importantly, metrics related to transformational progress with decarbonization and ending deforestation by the G-SIFIs and SICEs should be tied to executive performance (Ritz, 2022).

To fund the global effort to mitigate systemic climate risks from forest, food, and land use change, innovative financing is necessary. The NGFS has launched a new initiative at COP27, which aims to develop a "Blended Finance Handbook" that will provide information about how to attract and assemble funding from various private investors, philanthropists and multilateral development banks.[81] The G-SIFIs, due to their market power and implicit government subsidies (Ueda and di Mauro, 2013) are uniquely positioned to mitigate these risks and lean into opportunities, provided they are supported in precompetitive collaborations also with the SICEs. The results of these R&D collaborations for systemic reform relating to companies in the forest/food/land use sector should be made publicly available to ensure that there are no

[79] The current representative of the Fed at the FSB is Lael Brainard, Vice Chair of the Board of Governors of the Federal Reserve System. https://www.fsb.org/about/organisation-and-governance/members-of-the-financial-stability-board/

[80] https://www.fsb.org/work-of-the-fsb/market-and-institutional-resilience/post-2008-financial-crisis-reforms/ending-too-big-to-fail/global-systemically-important-financial-institutions-g-sifis/

[81] https://www.esginvestor.net/live/ngfs-targets-blended-finance-with-new-initiative/

limits on competition. The precompetitive sharing of results developed by the G-SIFIs and SICEs would disarm nascent criticism of alliances as cartels. Additionally, it would help scale and accelerate industry- and sector-wide progress in mitigating climate-related risks.

4. Specific G-SIFI actions the Fed/FSB might mandate in return for reducing some of the current burdensome regulations of G-SIFIs

Given companies' goal of maximizing shareholder value, what can the Fed/FSB do to incentivize the G-SIFIs to initiate the necessary large-scale reallocation of funds to end tropical deforestation, decarbonize and reform the production of food and land use? The G-SIFIs differ from other banks (and insurers) without this label in that they are "too big to fail" and would require a government bailout in the event of insolvency.[82] To prevent this politically and economically undesirable outcome, the FSB has imposed additional regulations that could be relaxed in return for the desired climate-related and nature-related actions (Financial Stability Board, 2021).[83] G-SIFIs could be allowed to enter into pre-competitive collaborations with their clients to support costly R&D and innovation that are required for rapid progress all along global supply chains.[84] Documented success would reduce credit risks for the G-SIFIs and the SICEs (Carbone et al., 2021)[85] and could be supported and rewarded, for example, with reduced capital requirements for the G-SIFIs.[86] It is interesting to note that Oehmke and Opp (2022) provide arguments against the use of green capital requirements and suggest that carbon taxes are a better policy tool.

Targeted mandates will have to be supportive of the equity value drivers (earnings and required rates of return) of both G-SIFIs and SICEs. Possible mandates may address the following:

1) G-SIFIs can originate green loans in accordance with the Green Loan Principles[87] and, additionally, their clients can issue green bonds in accordance with the Green Bond Principles or CBI certified bonds. G-SIFIs can also insert restrictive "green" covenants into loan contracts.[88]
2) G-SIFIs could enable their clients to take the desired actions by offering favorable required rates of return for projects that lower climate-related and nature-related credit risks. Ehlers et al. (2022) find that banks already charge a risk premium for Scope 1 emissions though it does not appear to be enough given their borrowers' carbon risk exposures.
3) Given their large client networks, G-SIFIs could assist SICEs with finding large, powerful corporate and government customers that are willing to pay premium prices for products that are free from deforestation and human rights concerns, thus helping to create and scale new markets.

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[82] The FSOC is authorized to designate insurers as systemically important nonbank institutions (Skinner, 2022).

[83] For a discussion of prudential regulation of large banks, see also https://sgp.fas.org/crs/misc/R45711.pdf

[84] The difference between collaborations under these agreements and a cartel would be that results of the agreements would have to be shared publicly and could not be used to limit competition in industries or markets.

[85] See also the recent $1.9 trillion warning from Moody's: https://www.campaignfornature.org/news/2022/10/11/moodys-has-a-19-trillion-warning-over-biodiversity

[86] For HLA requirements see https://www.bis.org/fsi/fsisummaries/g-sib_framework.htm

[87] https://www.worldbank.org/en/news/feature/2021/10/04/what-you-need-to-know-about-green-loans

[88] Currently, "green covenants" don't seem to be in use although a need for them has previously been noted: https://www.amazon.com/Need-Green-Covenants-Regulating-Market/dp/3668251975 . In fact, as the green bond market is developing and demand for green bonds currently exceeds supply, covenants of green debt appear to be weaker than covenants of conventional debt. This is likely to change as the market for green debt grows. https://capitalmonitor.ai/asset-class/fixed-income/green-bonds-weak-covenants/

4) G-SIFIs can also require that clients refrain from spending on the obstruction of climate policies and policies that support the conservation and restoration of nature, like carbon taxes. Funds previously dedicated for this purpose could be reallocated to uses more compatible with the incentives set by the Fed/FSB.

ANNEX 7. The role of the regional Federal Reserve Banks.

The regional Federal Reserve Banks have an obligation to serve their districts by educating the public on climate- and nature-related risks and environmental justice issues that impact their respective economic conditions and communities.[89] In addition, the regional Federal Reserve Banks may be able to green collateral lending policies and discount window lending requirements by widening haircut spreads for green vs brown assets (Vestergaard, 2022; Dafermos and Gabor, 2022).[90]

[89] Examples include past efforts by the San Francisco Fed https://www.frbsf.org/community-development/blog/survey-understanding-climate-related-risks-faced-by-low-and-moderate-income-communities-and-communities-of-color/ and the New York Fed https://libertystreeteconomics.newyorkfed.org/2022/09/how-do-natural-disasters-affect-u-s-small-business-owners/ . The Philadelphia Fed, too, is starting to publicly explore climate-related issues with a keynote address by the Philly Fed President at this conference: https://www.interdependence.org/events/browse/40th-amt-and-global-citizen-award-ceremony/

[90] https://www.frbdiscountwindow.org/pages/collateral/collateral_eligibility

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